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ABSTRACT

This paper is based on a 1988-89 international cooperative study funded by the Harold Macmillan Trust. Teachers and officials in several African, Asian and Arabic-speaking countries worked with the authors in describing and evaluating how computers arrived in their schools and what the machines are used for. Considerable data on national policy and practice came from China, Kenya, Jordan, Mauritius, Sri Lanka, Tunisia, and Zimbabwe. Drawing on these reports and other sources covering 23 developing nations, mainly Eastern Hemisphere, the authors wrote "Computers in Third World Schools" (Macmillan Press, May 1990). This paper: (1) analyzes the position facing developing Third World governments seeking a strong rationale for computer education and reviews four rationales: the Social, Vocational, Pedagogical, and Catalytic; (2) offers a critique of findings of the UNESCO Congress on Computers in Education in Paris in April 1989; and (3) asks whether dependency and unequal education are inevitable--in computer education--for Third World countries. (Author/DB)

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ECONOMICS, EDUCATION AND COMPUTERS IN THIRD WORLD SCHOOLS

David Hawkridge*, John Jaworski^ and Harry McMahon†

This paper is based on a 1988-89 international cooperative study funded by the Harold Macmillan Trust. Teachers and officials in several African, Asian and Arabic-speaking countries worked with the authors in describing and evaluating how computers arrived in their schools and what the machines are used for. Considerable data on national policy and practice came from China, Kenya, Jordan, Mauritius, Sri Lanka, Tunisia and Zimbabwe. Drawing on these reports and other sources covering altogether 23 developing countries, mainly Eastern Hemisphere, the authors wrote Computers in Third World Schools (Macmillan Press, May 1990). This paper (a) analyses the position facing Third World governments seeking a strong rationale for computer education and reviews four popular rationales: the Social, Vocational, Pedagogical and Catalytic; (b) offers a critique of findings of the UNESCO Congress on Computers in Education in Paris in April 1989, and (c) asks whether dependency and inequity are inevitable -- in computer education -- for Third World countries.

RATIONALES FOR COMPUTERS IN THIRD WORLD SCHOOLS

Why do Third World countries want to put computers into their schools? One reason offered is that children should be aware and unafraid of how computers work, because computers are pervading industrial societies and are likely to be important in Third World countries too. Since schools prepare students for life, they should prepare them to deal with computers, which ought to be de-mystified. This can be called the Social Rationale, because it deals with students' place in society. It leads Ministries of Education to provide classes or extra-mural clubs where children learn the principles on which computers work, including some elementary programming, but gain only a little hands-on experience. Usually they face no examination.

A second reason is that children should learn to operate computers, at least at a basic level. Teaching them programming gives children some confidence in their ability to control computers, and possibly lays the foundation for a career in computer science. Teaching children how to use applications programs gives them skills that may be useful to them as students and when they move into jobs. At school, runs the reasoning, boys and girls should take courses in 'computer literacy' or even 'computer science', quite often aimed at preparing them for an examination. This is the Vocational Rationale: computer education should be related to future jobs.

A third reason advanced is that children will learn physics, history or any other subject better through computer-assisted learning. This is the Pedagogical Rationale, calling for improved teaching and learning, and may well be the one that commands greatest support among educators. Computers should be classroom aids.

A fourth reason is that schools and the education they offer can be changed for the better by the introduction of computers. Teaching, administrative and managerial efficiency may be improved. Computers require students to do less memorizing of facts and more information-handling and problem-solving. Computers encourage students to learn by collaborating rather than competing with other students. Teachers using them adopt 'more relevant' curricula and bring educational opportunities to a larger number of children. Administrators improve the way they manage schools. Computers are seen as catalysts, enabling desired change in education to occur. This is the Catalytic Rationale.

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National policy on putting computers into schools depends to a large extent on the dominant rationale. The Social Rationale does not lead to the same policy as the Vocational one. For example, if a government wants to teach computer awareness in secondary schools, it may introduce rather low-cost microcomputers into a large number of schools. It will expect every school to have several teachers who, between them, can teach all students for 2-3 hours a week in, say, the second year. But if a government strongly influenced by the Vocational Rationale wants to introduce computer literacy or computer science, possibly as an examination subject near the end of secondary schooling, medium-priced microcomputers will be needed, teachers will have to be much better trained, and probably only selected classes will be able to take the course. The government will probably limit provision to a minority of secondary schools, on the grounds of shortage of resources and only a small national requirement for school graduates with computer science. Governments influenced by the Pedagogical and Catalytic Rationales must face a far larger bill for hardware, software and training. Developing and marketing suitable educational software is so costly that few countries attempt it. Many are importing software, but are unhappy with what they get, for educational and cultural reasons. Those doing without it are giving up hope of getting any.

Quite a few Third World countries are deciding to put computers in their schools. They place greatest emphasis on the Vocational Rationale, and much less on the Social, Pedagogical and Catalytic. Ministries of Education without a policy on computers in schools are waking up to the fact that they need one, based on a clear rationale. The computers come anyway, through donations or purchased out of non-government funds. This sort of pressure can be very damaging. Without a policy computers arrive in uncoordinated fashion. Teachers are not trained. Software is scarce. Hardware is incompatible. Spares, repairs and maintenance barely exist. Expensive private schools survive best, with foreign contacts, quickly widening the gap between their students and the rest.

Ministries of Education with a policy, backed by a rationale or rationales, may still be unable to give computers high priority. But at least they are able to take important decisions, within the policy. For example, should they allow their schools to accept donations of hardware, particularly of obsolete hardware? Should they require schools to have at least one properly trained teacher before obtaining a computer? Should they set up a centre for support services and possibly to develop educational software? What degree of dependence on other countries can they tolerate?

A CRITIQUE OF FINDINGS OF THE UNESCO CONGRESS, PARIS APRIL 1989

UNESCO has taken a commendable lead in generating debate on such matters, but in the General Conclusions of this Congress, participants noted that there should be a 'supporting base' for information technology in higher education, before other sectors of education obtain computers. Universities can be quite unsympathetic towards use of computers in secondary schools, however, and computer scientists can push the innovation towards rather limited applications. Certainly, a base is essential for training teachers and technical support staff.

Congress called for economic justification to be found for the large investment required, and suggested that financial projections should be incorporated into a cost-benefit model. Yet the cost-effectiveness of computers in education is more or less untested and probably cannot be proven. Even efforts to sustain any of the four Rationales above require somewhat sweeping assumptions. For example, the Vocational Rationale draws strength from apparent needs of industry and commerce, but should these needs be met by computer education at school or thereafter?

Congress also recognised difficulties for developing countries in funding this innovation and suggested long-term planning might result in it being given high enough priority to attract resources 'from home and abroad'. Our view is that in the Third World resources are so scarce that each government should give priority to funding for computers in

schools only when a strong case has been made and accepted, in terms of one or more of the Rationales, at home and possibly abroad.

Congress apparently adopted the Pedagogical Rationale and rejected, or at least deferred, the Vocational one, in saying that the 'primary focus in introduction of new information technology in schools should be as a learning aid to students in important courses...study of these technologies, informatics, can be considered at later stages.' Our own view is that this ideal course of action has so far proved too difficult and expensive for developing countries, which have in fact done exactly the reverse.

Congress stressed the need for each country to develop educational software. This is beyond the reach of developing countries during the 1990s, except on a very small and uneconomic scale. Industrial countries such as the UK and US have not set a convincing example. Some participants proposed international co-production and adaptation of educational software for developing countries. Our own experience leads us to give guarded support to the principle. International co-production is seldom cheap or easy, and its products are often shelved. Instead, international adaptation of software offers opportunities for developing countries to benefit more directly and at much lower cost, provided that cultural imperialism can be avoided.

ARE DEPENDENCY AND INEQUITY INEVITABLE?

Dependency began in developing countries when colonial administrations established patterns of demand which could only be met by imports from industrial countries, and these patterns were passed on to local elites. After independence, transnational corporations assisted new nations to set up industries aimed at reducing imports. Transfer of technology into these industries from abroad ensures that developing countries are almost totally dependent on foreign technology for their means of production, and products of these industries pervade their marketplaces. Local firms cannot compete against the transnationals, or are discouraged by government from doing so. This bleak dependency theory was founded on the experience of Latin American countries, yet many of these have advanced technologically, often with the help of transnational corporations. The emergence of newly industrial countries, such as South Korea, is partly based on growing indigenous technological capability. While some say that nothing can be done, and others say nothing should be done, about technological dependency, we believe that with increased education and skills, producing high-level technologists, there is greater independence.

For developing countries, bringing computers into schools seems certain to increase their dependency in the short term. In some cities, the graduates fill 'data entry and software writing sweatshops', serving industrial nations. The percentage of high-level technology jobs is far lower than in industrial countries. Governments must plan for the long term, however, and for technological advance. Ministries of Education should be preparing for greater independence by creating a pool of technological talent as rapidly as possible. External aid should be used to train a cadre of highly know- ledgeable Third World computer educators, skilled in formulating policy, evaluating and selecting software for their own countries, and in training teachers and others.

What of equity between countries and within them? The sum available per child per year in the average African school is enough to buy only three blank floppy disks. Zambian and Tanzanian schools lack seats for children or chalk for teachers. In developing countries must computers be only for those already succeeding in education, or for children of a favoured elite? Can the technology benefit all? New approaches to learning, catalysed by information technology, are changing students' expectations about access to information and to the dialogues which create knowledge. These changes in attitude are profound, and as maturing students carry them into national social, economic and political life, so their impact will grow. For the long term, into the next century, the Catalytic Rationale is the best justification for computers in Third World schools.